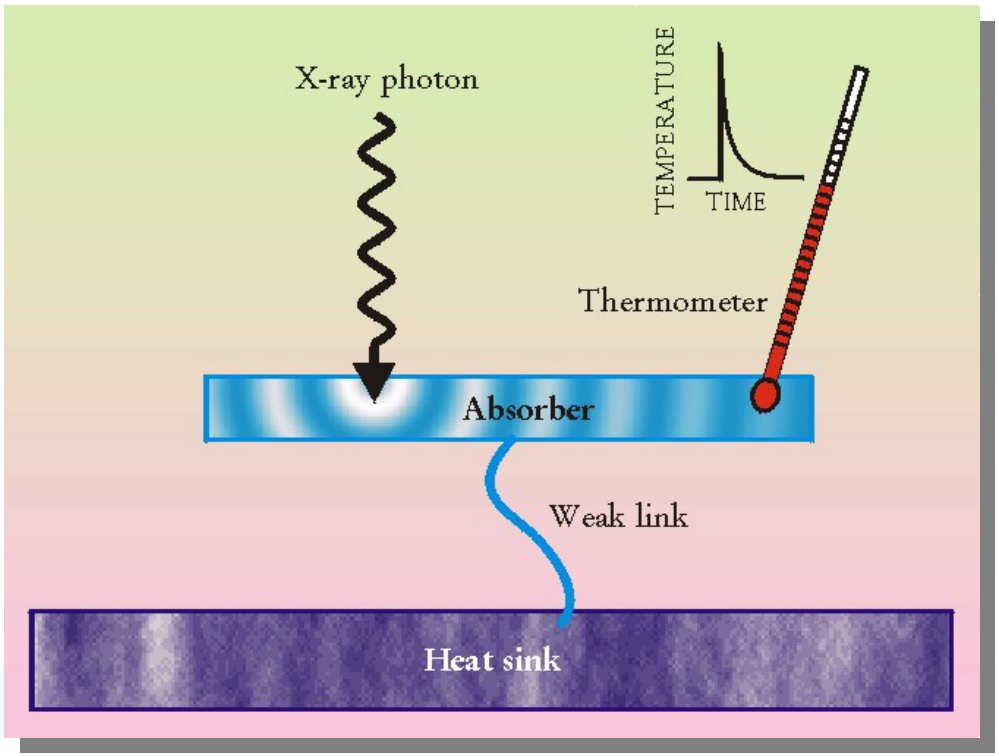
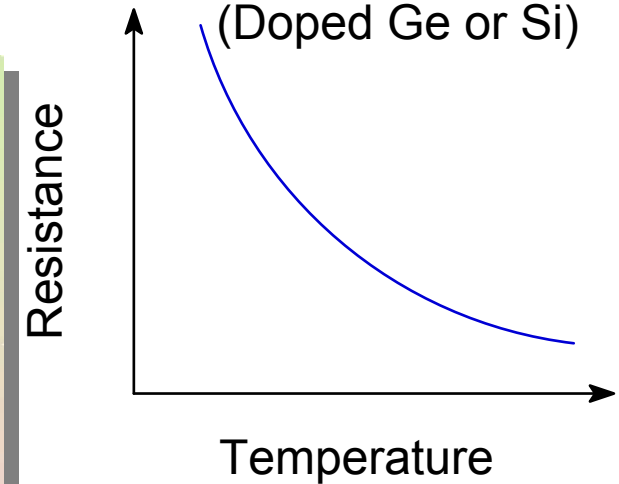
Agenda for Microcalorimeter Segment

Overview *R. Kelley*	10 min
Microcalorimeter & Readout Progress at NIST *Kent Irwin*	20 min
Microcalorimeter Progress at GSFC *Caroline Stahle*	20 min
Microcalorimeter Progress at SAO *Eric Silver*	20 min
Simulations of Bright X-Ray Sources with TES Microcalorimeters *Enectali Figueroa*	15 min
Discussion *R. Kelley*	5 min

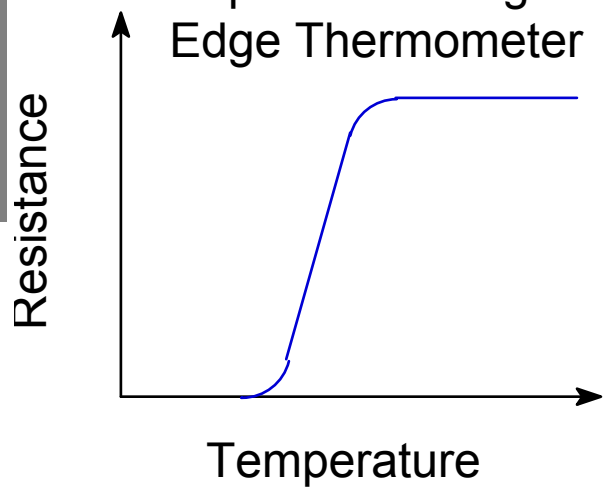
X-ray Microcalorimeter



Semiconductor Thermometer
(Doped Ge or Si)



Superconducting Transition
Edge Thermometer



Overall Status as of Today

Energy Resolution

2.0 - 2.5 eV at 1.5 keV

4 - 6 eV at 6 keV

Array Size

Only single pixel *test results* thus far. (small arrays have beed fabricated)

Counting rate

Pulse decay time constants of ~ 300 μsec

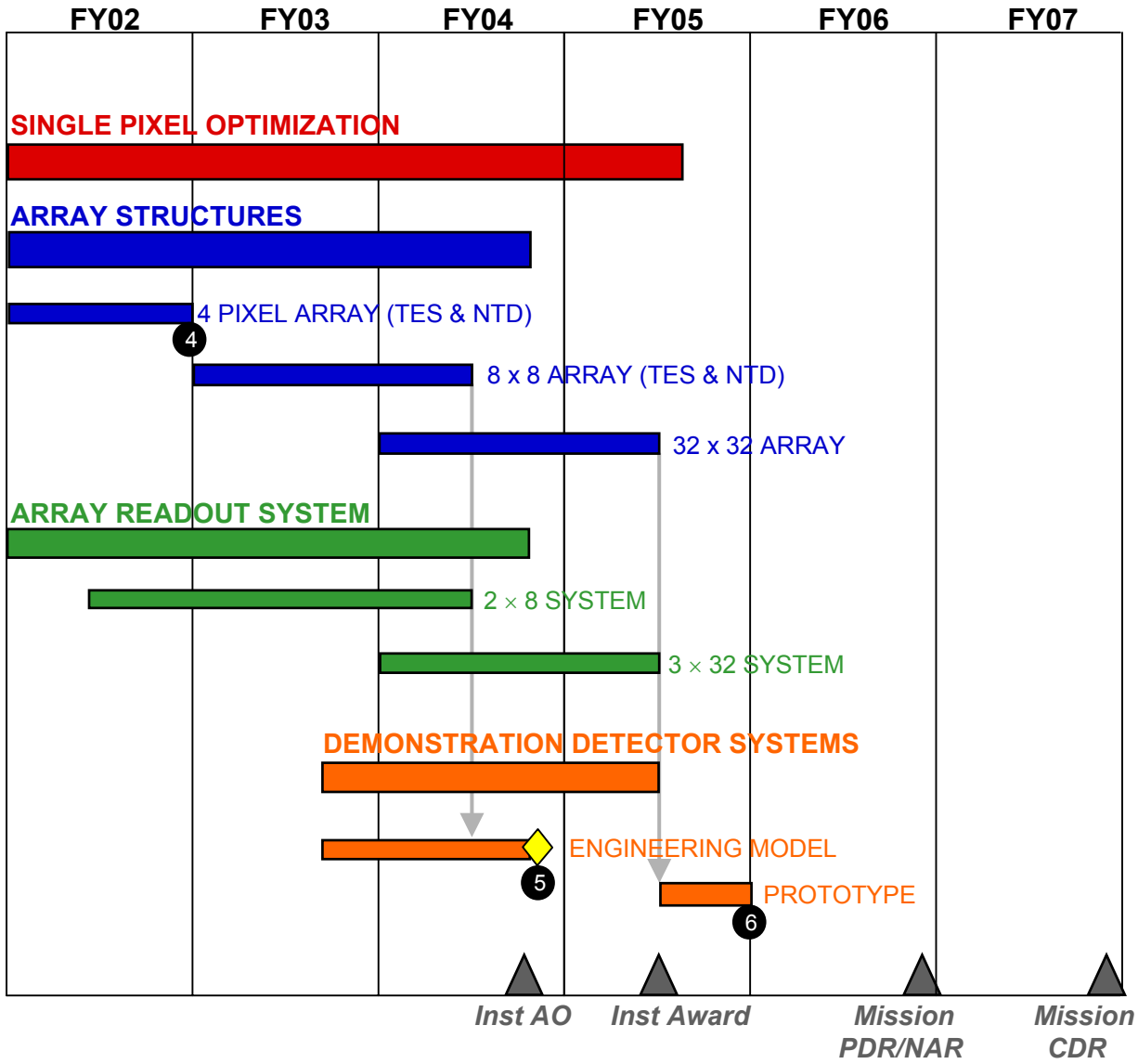
Readout Schemes

32 channel XRS system, analytical designs for larger JFET systems; MUX designs and functional systems for IR TES.

For TRL-6, we need to demonstrate

- 2 eV at 6 keV (and below) with high degree of pixel-pixel uniformity (how much?)
- Robust array scheme with high-yield process.
- Faster pulses (< 300 μsec)
- Large array readout schemes compatible with extended life mission.

X-ray Calorimeter Technology Roadmap



X-ray Calorimeter Critical Technology Milestone

- **Small X-ray Calorimeter Array Fabricated and Tested**
  - ❑ Pixel scale and quantum efficiency appropriate to Constellation-X baseline requirements.
  - ❑ Energy resolution of 2 eV at 1.5 keV and 4 eV or better at 6 keV, simultaneously in each pixel.

WORKSHOP ON TRANSITION EDGE SENSOR DEVICE PHYSICS

25 - 26 April 2002

NATIONAL INSTITUTE OF STANDARDS AND TECHNOLGY
BOULDER, COLORADO

Organized by Kent Irwin, Piet de Korte, et al.

Participants

New TES results from throughout the world

USA

- NIST
- GSFC
- U. Wisconsin
- California Institute of Technology
- Lawrence Livermore National Laboratory
- Santa Clara University, Stanford University

Europe

- SRON, University of Jyväskylä (Finland)
- University and INFN of Genoa, Italy

Japan

- ISAS and Tokyo Metropolitan University

Different thermometer materials, different thermometer geometries, different fabrication processes, different readout schemes. Open sharing of device designs, test results (good and bad), and fabrication issues.

Start Development of Anticoincidence Detector

Would like an effective anticoincidence detector that can be readily incorporated into the detector system.

- Semiconductor calorimeter ⇒ using JFETs ⇒ use Si ionization detector (Astro-E design).

- TES calorimeter ⇒ using SQUIDs ⇒ use TES detector attached to VERY large absorber. TES senses non-thermal ballistic phonon signal.

- Initiated 2 year study.
- PI: Blas Cabrara, Stanford University
- Lots of experience with this technology and the need for VERY low background rates for dark matter searches.
- Post doc to start work on this in the Fall.